Patent claims

1. Method for the in vitro or in vivo degradation of amorphous or crystalline silicone dioxide (condensation products of the silicic acid, silicates), silicones and other silicon (IV)- or metal (IV)-compounds as well as of mixed polymers of these compounds, wherein a polypeptide or a metal complex of a polypeptide is used for the degradation, characterized in that the polypeptide comprises an animal, bacterial, plant or fungal carbonic anhydrase domain that exhibits a sequence similarity of at least 25% to the sequence shown in SEQ ID No. 1.

2. Method for the synthesis of amorphous silicone dioxide (condensation products of the silicic acid, silicates), silicones and other silicon (IV)- or metal (IV)-compounds as well as of mixed polymers of these compounds, wherein a polypeptide or a metal complex of a polypeptide is used for the synthesis, characterized in that the polypeptide comprises an animal, bacterial, plant or fungal carbonic anhydrase domain that exhibits a sequence similarity of at least 25% to the sequence shown in SEQ ID No. 1.

3. Method according to claim 2, characterized in that compounds such as silicic acids, monoalkoxysilantrioles, dialkoxysilandioles, trialkoxysilanoles, tetraalkoxysilanes, alkyl- or aryl-silantrioles, alkyl- or aryl-monoalkoxysilandioles, alkyl- or aryl-dialkoxysilanoles, alkyl- or aryl-trialkoxysilanes or other metal(IV)- compounds are used as reactants (substrates) for the synthesis.

4. Method according to claim 3, wherein mixed polymers having a defined composition are produced by using defined mixtures of the compounds.

5. Method according to any of claims 2 to 4, wherein the formation of defined two- and three-dimensional structures occurs by the polypeptide or a metal complex of the polypeptide or the binding of the polypeptide or a metal complexes of the polypeptide to other molecules or the surfaces of glass, metals, metal oxides, plastics, biopolymers or other materials as a template.

6. Method for the modification of a silicic acid or silicon(IV)- or metal (IV)-compound containing structure or surface, wherein a polypeptide or a metal complex of a polypeptide is used for the modification, characterized in that the polypeptide comprises an animal, bacterial, plant or fungal carbonic anhydrase domain that exhibits a sequence similarity of at least 25% to the sequence shown in SEQ ID No. 1.

7. Method according to claim 6, wherein the silicic acid-containing structure or surface is present in form of a precious stone or semi-precious stone.

8. Method according to claim 6 or 7, wherein the modification comprises a smoothing, an etching or the production of burrows of the silicic acid or silicon(IV)- or metal(IV)-compound-containing structure or surface by the polypeptide or a metal complex of the polypeptide.

9. Chemical compound or silicic acid-containing structure or surface, obtained according to a method of the preceding claims.

10. Silicic acid-containing structure or surface according to claim 9 in the form of a precious stone or semi-precious stone.

11. Polypeptide of a silicase from Suberites domuncula according to SEQ ID Nr. 1 or a polypeptide being homologous thereto, which in the amino acid sequence of the carbonic anhydrase domain exhibits a sequence similarity of at least 25% to the sequence shown in SEQ ID No. 1, a metal complex of the polypeptide, or parts thereof.

12. Nucleic acid, in particular according to SEQ ID No. 2, characterized in that it essentially encodes for a polypeptide according to claim 11.

13. Nucleic acid according to claim 12, characterized in that it is present in the form of a DNA, cDNA, RNA or mixtures thereof.

14. Nucleic acid according to claim 12 or 13, characterized in that the sequence of the nucleic acid has at least one intron and/or a polyA-sequence.

15. Nucleic acid according to any of claims 12 to 14 in the form of its complementary "antisense"-sequence.

16. Nucleic acid according to any of claims 12 to 15 in the form of a (a) fusion protein-(chimeric protein) construct, (b) construct having a separate protein-expression (protease-cleavage site) or (c) construct having a separate protein-expression (cassette-expression).

17. Nucleic acid according to any of claims 12 to 16, characterized in that the nucleic acid has been synthetically produced.

18. Vector, preferably in the form of a plasmid, shuttle vector, phagemid, cosmid, expression vector, retroviral vector, adenoviral vector or particle, nanoparticle or liposome, comprising a nucleic acid according to any of claims 12 to 17.

19. Vector, preferably in the form of a nanoparticle or liposome, comprising a polypeptide according to claim 11.

20. Host cell, transfected with a vector or infected or transduced with a particle according to claim 18 or 19.

21. Host cell according to claim 20, characterized in that it expresses a polypeptide according to claim 1, a metal complex of the polypeptide or parts thereof.

22. Polypeptide according to claim 11, characterized in that the polypeptide has been synthetically produced.

23. Polypeptide according to claim 11, characterized in that the polypeptide or the metal complex of the polypeptide is present in a prokaryotic or eukaryotic cell extract or lysate.

24. Polypeptide according to claim 23, characterized in that the polypeptide or the metal complex of the polypeptide is present being purified essentially free of other proteins.

25. Method for identifying of inhibitors or activators of a polypeptide of a silicase from Suberites domuncula according to SEQ ID No. 1 or a polypeptide being homologous thereto that in the amino acid sequence of the carbonic anhydrase domain has at least 25% sequence similarity to the sequence shown in SEQ ID No. 1, wherein a) a polypeptide of a silicase from Suberites domuncula according to SEQ ID No. 1 or a polypeptide being homologous thereto that in the amino acid sequence of the carbonic anhydrase domain has at least 25% sequence similarity to the sequence shown in SEQ ID No. 1 is provided, b) the polypeptide from step a) is contacted wit a potential inhibitor or activator, and c) the ability of the polypeptide is measured to degrade or synthesize silicate or silicones.

26. Method according to claim 25, wherein the polypeptide of a silicase from Suberites domuncula according to SEQ ID No. 1 or a polypeptide being homologous thereto that in the amino acid sequence of the carbonic anhydrase domain has at least 25% sequence similarity to the sequence shown in SEQ ID No. 1 is provided in vivo, in a cellular extract or lysate or in purified form.

27. Method for producing a pharmaceutical composition, comprising a) identifying of an inhibitor or activator according to claim 25 or 26 and b) mixing of the identified inhibitor or activator with a pharmaceutically acceptable carrier or excipient.

28. Use of a polypeptide or a nucleic acid or pharmaceutical composition according to any of the preceding claims for the prevention or therapy of silicosis.

29. Use according to claim 28, wherein the prevention and therapy of silicosis occurs by dissolving of quartz crystals

30. Use of a polypeptide or a nucleic acid or pharmaceutical composition according to any of the preceding claims for the resorption or for modulating the resorbability of silicones and silicone implants.

31. Use of a nucleic acid according to any of the preceding claims for transfecting cells for the resorption or for modulating the resorbability of silicones and silicone implants.